ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 41.] MAY. [1890.

CXLII.—LAGOS RUBBER.

(*Ficus Vogelii*, Miq.)

In the *Kew Bulletin* for November 1888, page 253, an account was given of the attempt made to utilise the "Abba" trees of West Africa, for the purpose of yielding commercial rubber. The subject has been very enterprisingly taken up by Sir Alfred Moloney, K.C.M.G., Governor of Lagos, and at his request further attempts have been made by Mr. Walter Higginson, Inspector of Police and Acting Commissioner at Badagry, to prepare rubber from "Abba" trees in commercial quantities. The large amount of resin present in this particular rubber has hitherto prevented its extended use in this country. It is evident, however, that some advance has already been made to overcome this drawback, and if experiments are continued with the fresh latex it may be possible to obtain a product comparatively free from resin. In the investigation of the recent specimens of rubber received from Lagos this establishment is greatly indebted to Mr. S. W. Silver, F.L.S., for an interesting report obtained from the India Rubber, Gutta Percha, and Telegraph Works Company (Limited), Silvertown.

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COLONIAL OFFICE to ROYAL GARDENS, KEW.

SIR, Downing Street, 22nd January 1890.

I AM directed by Lord Knutsford to transmit to you, for your information, a copy of a Despatch from the Officer Administering the Government of Lagos, reporting the despatch of 40 lbs. of rubber to the Crown Agents for transmission to your department, and I am to state that Lord Knutsford would be obliged if you could obtain a report as to the market value of this specimen.

I am, &c.
(Signed) R. H. MEADE.

The Director of Kew Gardens.

DISTRICT COMMISSIONER, BADAGRY, to COLONIAL SECRETARY.

SIR, Badagry, November 20, 1889.

I HAVE the honour to inform you that owing to the rains stopping and the sap of the trees drying up, I have only been able to obtain 40 lbs. of rubber instead of the 100 lbs. proposed in his Excellency's Minute.

The cost has been 1*l.* 19*s.* 8*d.*, or a fraction less than 1*s.* per lb. It is ready packed for shipment to England, and as no more can be obtained until the sap forms again in April, I would suggest its being forwarded at once, so that on my arrival in England I can be instructed to give the mode of working fully, should it prove successful. I could also attend at Silvertown and witness the working of the rubber, and be shown the best way of separating the natural acid from it.

This amount, although small, is I think, more than was supplied by Mr. Millson from one tree.

I have, &c.
(Signed) W. HIGGINSON,
Acting District Commissioner.

The Hon.
The Colonial Secretary, Lagos.

DISTRICT COMMISSIONER, BADAGRY, to the COLONIAL SECRETARY, LAGOS.

[Extract.] Badagry, 10 December 1889.

While in Lagos in October last, I had the honour to submit to his Excellency some specimens of rubber made by me on the Gold Coast plan, and he was pleased to direct me to obtain 100 lbs. at a cost not exceeding 5*l.* for export to England, for examination as to quality, etc., but up to the present I have only obtained 40 lbs. at a cost of a fraction under 1*s.* the lb.

I cannot of course say whether the little I have will turn out satisfactory or not, but I have taken the very greatest pains in its preparation, and I am sure it will be found quite free from dirt of all kinds, and I hope of acids.

Perhaps a few remarks as to the mode followed by me may be found useful, as it may not be well known in Lagos, although common on the Gold Coast.

When the milk is first brought to me in gin bottles, I at once strain it into perfectly clean bottles through a piece of muslin fixed in a frame. The bottles are then allowed to stand for 24 hours for the milk to rise. It is then poured into a large tin, and put on the fire to boil. If much

water is seen with the milk, none is added; but if only a little, about a pint of water is added to every six bottles. As the water and milk begin to boil, lime juice is added in the quantity of one lime to each bottle. This assists the rubber to coagulate. When all the rubber in the water has formed into a large lump, it is taken out and forced into tin moulds, perforated and fixed in wood cases. Heavy weights are then laid on for 12 or 24 hours, and then the rubber is taken out, when it will be found ready for shipment.

The muslin strainer is very easily washed, as it need only be turned over and water poured through it from a height.

At present, owing to the rains ceasing and the sap of the trees drying up, little or no milk can be obtained, although I have increased my price to 4*d.* a bottle; what little I did get was not good, and I found it useless.

If one could only induce the natives to collect the milk, a large trade might be done; but they are intolerably lazy, and do not care to attempt a new trade. At the least a man should be able to get eight or 12 bottles a day, for which he would receive 2*s.* or 3*s.*, but the usual quantity brought me was four or six bottles, and then half of it was water. When I refused to take it or pay more than half price, they grumbled, and would not go again, saying it was too much trouble, and too little pay. Even the boys in the town declined to get it for 3*d.* per bottle, saying they preferred doing nothing at home; and when I spoke to the Chiefs about their lazy habits, which could only lead them into mischief, they confessed that these young men and boys were quite beyond their control or that of their fathers. This is certainly a bad state of things for the district, and one which I have endeavoured to check as far as it lies in my power; but I fear, unless the Chiefs exercise their authority, and do their best to assist the District Commissioner, it will be hard work.

ROYAL GARDENS, KEW, to the COLONIAL OFFICE.

SIR, Royal Gardens, Kew, 21 April 1890.

I AM desired by Mr. Thiselton Dyer to acknowledge the receipt of your letter of the 22nd January last, forwarding a copy of a despatch from the Officer Administering the Government of Lagos, on the subject of forty pounds of rubber prepared from "Abba" trees by Mr. Higginson, and shipped to this country for valuation and report.

2. In reply, I am to state that this sample of rubber was prepared at the request of Sir Alfred Moloney, in continuation of experiments undertaken by Mr. Millson at Badagry, and discussed in my letter of the 11th September 1888. The previous history of the subject is given in the *Kew Bulletin* for November 1888, pp. 253–261. The Abba trees of West Africa doubtless include several species of *Ficus*. From specimens forwarded to this country by Mr. Millson, it is pretty clearly shown that one at least of them is *Ficus Vogelii*, Miq. It is desirable for a fuller elucidation of the subject that herbarium specimens, including fruits, of all Abba trees used in the preparation of rubber, be forwarded to Kew for determination.

3. In the experiments undertaken by Mr. Higginson, this gentleman appears to have entered upon his investigations with commendable zeal and energy. He has fully realized the difficulties attending the preparation of rubber from Abba trees, and the methods adopted to over-

come these difficulties, it will be noticed, have resulted in an article superior in many respects to former samples.

4. As on the former occasion the Abba rubber received from Lagos was forwarded through Mr. S. W. Silver, F.L.S., to the India Rubber, Gutta Percha, and Telegraph Works Co., Limited, Silvertown, and a copy of the report received from this Company is enclosed. This report is on the whole favourable. The rubber was free from impurities, and had not suffered any deterioration in transit, two points of considerable importance in regard to African rubbers as usually received in this country. In the next place while former samples were reported as not suitable to be used alone in any form, and troublesome to work in the mixing machines, the present samples were free from these objections. In fact the Abba rubber, as prepared by Mr. Higginson, is now capable of being "used alone for many purposes."

5. As stated by Mr. Millson, the Abba trees of West Africa are widely distributed and are generally used as shade trees in market places, streets, and compounds. They can be propagated by "the "simple method of cutting off a branch and pushing it into the ground, "and on account of the facility and rapidity with which it grows, the "natives use it largely for fence posts." Further, Mr. Millson states "from the trees already in full growth in the bush and towns, a con- "siderable export trade could be readily established, and systematic "planting [of Abba trees] would develop this trade to almost an un- "limited extent."

6. The conclusions to be drawn from the information contained in the last two paragraphs are obvious. Sir Alfred Moloney has evidently the opportunity of adding another important industry to West Africa. Mr. Higginson, while on leave in this country, has devoted attention to the chemical composition of rubber, and through the kindness of Mr. Silver, has obtained facilities for watching the treatment of the samples, prepared by him, at the Silvertown works. On his return to Lagos, Mr. Higginson will be in a position to continue with a fuller and wider knowledge of the subject, the investigations into the preparations of Abba rubber, and no doubt Sir Alfred Moloney will place him in a position to utilize this knowledge to the best advantage in the interest of the Colony.

7. Samples of prepared Abba rubber, manufactured at the Silvertown works, to illustrate the remarks contained in the report are forwarded direct by parcel post to the address of the Governor at Lagos.

I have, &c.

The Hon. R. H. Meade, C.B.,
Colonial Office, S.W.

(Signed) D. Morris.

Mr. S. W. Silver, F.L.S., to Royal Gardens, Kew.

3, York Gate, Regent's Park, N.W.,
21 March 1890.

Dear Mr. Morris,

Some additional delay has taken place in forwarding the report, dated Silvertown, 20th inst., upon the last little consignment of Lagos rubber placed in my hands by you for examination, accompanied by results in the shape of samples in various stages.

I hope you will agree with me as to the tenor of it, and in due course I expect to hear that Mr. Higginson is encouraged to such an extent

as to pursue diligently what I gathered from him, when I had the pleasure of seeing him at Silvertown, was his intention, viz., to make the rubber from Lagos sought after in the London market.

I am, &c.

D. Morris, Esq., F.L.S.,
Royal Gardens, Kew.

(Signed) S. W. Silver.

Report on Lagos Rubber.

India Rubber, Gutta Percha,
and Telegraph Works Co., Limited,
Silvertown, March 20, 1890.

The form in which this rubber was received consisted principally of blocks or bricks, measuring on an average 6 in. × 5 in. × 2 in. They had blackened on the outside, from oxidation, which extended inwards. These blocks had adhered, but were easily separated. They showed no signs of deterioration in transit, such as are found in many kinds of African rubber. The absence of impurities deserves mention in comparison with rubber that may be classed with this.

Every care on the part of the collector should be taken in order that the "Lagos rubber" may become known for its superior quality.

The favourable opinion we expressed on the samples sent to Kew by Mr. Alvan Millson are fully sustained by this consignment.

In the report upon these samples it was stated that (*Kew Bulletin*, November 1888, pp. 257–8–9,) "Mixed with a suitable proportion of "sulphur, and vulcanized, they cured soft and short, but were not "blistered.

"It can evidently not be used by itself in any form. All the "samples were troublesome to work in the mixing machines."

Special attention has been paid to these points on this occasion, and whilst we are not able to modify what is expressed in the first paragraph, we find that this consignment is free from the objection referred to in the second paragraph.

The drying after washing is troublesome. The behaviour in the mixing machines is satisfactory, and admits of its being used alone for many purposes.

This consignment lost 10 per cent. in washing and drying, and 13 per cent. on treatment with alcohol, so as to take out resins, &c. Evidently the latter treatment, whilst adding considerably to the expense, is unnecessary, as no very marked improvement takes place.

CXLIII.—MEALY BUG AT ALEXANDRIA.

(*Crossotosoma ægyptiacum*, J. W. Douglas.)

A mealy bug, very destructive to cultivated plants, has recently made its appearance at Alexandria. From specimens of the female insects contributed by Admiral Blomfield to Kew, Mr. J. W. Douglas, F.E.S., has determined them to belong not only to a new species but also to a new genus of the already large family of *Coccidæ*.

From the information so far received it would appear that this new plague of Egypt is likely to prove a very troublesome and destructive pest amongst cultivated plants, and very similar in many respects to *Icerya Purchasi* (*Kew Bulletin*, August 1889). In the following notes a method is suggested for the treatment of plants affected by Coccids that may be of service at Alexandria. In any case it is hoped that steps will be taken to prevent the insect from spreading from Egypt to other countries in the Mediterranean region.

Admiral Blomfield to Royal Gardens, Kew.

The Port House, Alexandria,
October 25th, 1889.

Dear Professor Oliver,

I see in the August number of the *Kew Bulletin* an interesting account of *Icerya Purchasi* and its depredations in South Africa, California, &c.

During the past four years our gardens at Alexandria have been invaded by a Coccus which threatens now to destroy all our trees and is causing the greatest alarm here. I have taken the liberty of sending some specimens in a tin box. Our local savants do not seem satisfied as to its scientific name, although one has pronounced it to be the Common Mealy Bug, *C. adonidum*, which I imagine to be a very much smaller insect.

It first appeared about four years ago, when I noticed it in quantities on the under side of the leaves of a banyan tree, but it has since spread with extraordinary rapidity, and one of our most beautiful gardens, full of tropical trees and shrubs has been almost destroyed. A breeze sends the cottony bugs down in showers in all directions. It seems to attack almost any plant, but the leaves of *Ficus rubiginosa* and one or two other kinds of fig seem too tough for it and it will not touch them. It seems almost hopeless here for a few horticulturists to try to eradicate this formidable pest whilst their indifferent neighbours are harbouring hotbeds of it, and there will have to be some strong measures taken by law to put it down. If you can give any advice in the matter I am sure Alexandrians will be most grateful.

I am, &c.
(Signed) W. R. Blomfield.

Professor Oliver, F.R.S.

Professor Riley to Royal Gardens, Kew.

Division of Entomology, Department of Agriculture,
Washington, D.C., December 6th, 1889.

Dear Mr. Morris,

Yours of the 25th of November, enclosing a letter from Admiral Blomfield, has just come to hand. It will give me great pleasure to send "Insect Life" to the Admiral or to any friend or correspondent

of yours whom you think would be interested. I am also very much pleased to receive the account of the Bark-louse damage in Egypt, and hope that Mr. Douglas will be able to determine the species. I should also be glad to receive specimens.

If the insect is a *Dactylopius* [as first suggested by Mr. Douglas], the Alexandrians cannot do better than to use one of the resin washes with which we are spraying *Icerya* so successfully in California. A very good formula is that published in the October No. of "Insect Life" (Vol. II., p. 92).

Yours, &c.

D. Morris, Esq., F.L.S.,
Royal Gardens, Kew.

(Signed) C. V. Riley.

Rosin Wash for Red Scale.

"In accordance with instructions from the division, Mr. Coquillet has been making experiments with this wash against the red scale (*Aspidiotus aurantii*), and after 20 different tests made with various preparations, from the 17th of July to the 8th of August, the one which gave the best results was found to be composed of rosin, 20 lbs.; caustic soda (70 per cent. strength), 6 lbs.; fish oil, 3 lbs.; and water to make 100 gallons. In preparing this wash the necessary materials were placed in a boiler and covered with water, and then boiled until dissolved, and stirred occasionally during the boiling. After dissolving, the preparation was boiled briskly for about an hour, a small quantity of cold water being added whenever there was danger of boiling over. The boiler was then filled up with cold water, which mixed perfectly when added slowly and frequently stirred. It was then transferred to a strong tank, and diluted with water to 100 gallons. Neither the leaves nor the fruit were injured, while a large proportion of the scales were destroyed. Those which escaped were either on the fruit or the under side of the leaves. The cost of the wash is 80 cents for 100 gallons, or four-fifths of a cent per gallon. An orange tree, 16 feet tall by 14 feet in diameter, was given 14 gallons. This, however, seems to us to be an unnecessarily large amount, but upon this basis the cost of spraying per tree is 11·2 cents."

A full description, with figures, of the Alexandrian Mealy Bug was given in the *Entomologists' Monthly Magazine* for the month of March last, p. 79. We are indebted to the courtesy of the Editors for permission to republish the description and for the use of the blocks to illustrate it.

Notes on some British and Exotic *Coccidæ* (No. 15) by J. W. Douglas, F.E.S.

Crossotosoma, *n. g.*

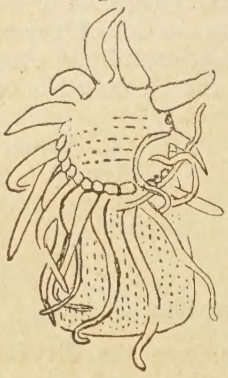
♀. Antennæ of 11 joints. Eyes not facetted, oval, produced in the form of a sub-conical truncate tube. Rostrum present. Body surrounded with a marginal fringe of long opaque processes. Anal ring not evident. Legs simple.

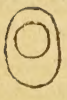
CROSSOTOSOMA ÆGYPTIACUM, *n. sp.*

♀ adult. Deep orange, becoming black after death; broad oval, slightly convex above. Head small, rounded in front. Antennæ (fig. 1) black, short, stout, of 11 wide joints, with many projecting pale hairs; the first three cylindrical, 1st broadest, 3rd longest; 4th to 10th short, in length subequal, the sides curved out from the wide base to the rounded wider apex, the anterior margin of each with a pale ring; the 11th much longer than the 3rd, sub-ovate, the base small, the apex rounded, the latter with many long hairs, two of them specially very long. Eyes (fig. 2, profile and front) black, shining, not facetted, projecting from a wide, oval base in the form of a short, sub-conical, truncate tube, of which one side is irregular, being constricted near the base; viewed in front the tube is translucent. Thoracic segments occupying nearly half the length of the body, strongly defined by incisions, those of the abdomen less so, but all distinctly marked. In the first stage of adultness the whole smooth surface has a pellicle of white waxen matter closely adherent, but easily detached, and often more or less rubbed off; eventually, as the ovisac is developed, exudation of waxen and cottony matter obscures the segmentation. At first there is a narrow, well-defined marginal rim all round the body, afterwards there is a flattened area exterior to this; from just below it, on each side of the abdomen, is a projecting fringe of 7–8 distinct, contiguous, stout, sinuate, tapering, waxen, snow-white, opaque, fragile processes, 3–5 mm. long, much curved round at the pointed ends, all, as a rule, tending downwards. In one specimen, sheltered within a curved leaf, a similar, but thicker, straighter, obtuse, upturned or horizontal appendage also proceeds from the sides of each of the thoracic segments, and two from the head (fig. 3), the latter close together, the others wide apart. This is the most perfect example, and I regard it as typical of the species; in the other specimens these appendages, which are very fragile, have been more or less broken off by the incidents of the position of the insects on loose leaves during transit. Close under the processes at the end of the abdomen, and reaching backwards as far as their extremities, is the white, broad, plump, posteriorly rounded cottony ovisac: it then curves under the abdomen and completely covers the under-side of it, closely attached

Fig. 1.

Fig. 3.





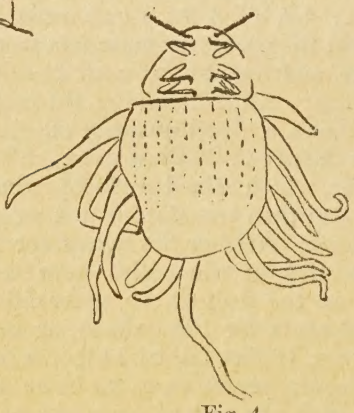


Fig. 2.

Fig. 4.

thereto at the edges, forming a capacious receptacle, quite smooth externally, but with the faintest indications of longitudinal striæ (fig. 4); above this the abdomen remains horizontal.

On the under-side the margin of the body all round is closely set with fine, projecting hairs; terminal segment rounded; anal ring not evident.

Rostrum small, conical, black, seta rather long, brown. Legs (fig. 5) black, with fine long hairs; femora with one specially long hair on the inner side; tibiæ two and a half times longer than the tarsi; claw short; no capitate digitules.

Length of body, 5, breadth 4 mm.

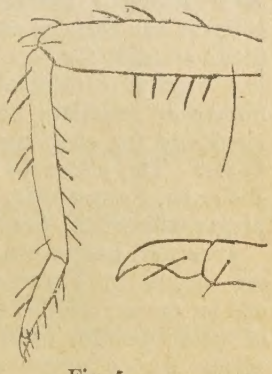


Fig. 5.

Young larva (fig. 6). A few found under two of the most mature ovisacs. Yellowish, oval. Antennæ of six joints, the last long, obtuse-fusiform, all with long hairs, two of them specially longer on the last joint. The last segment of the abdomen with a rounded median emargination; each of the small resulting side lobes, sharply denticulate on the margin, bears three long setæ (thus six in all), each of them springing from a small tubercle.

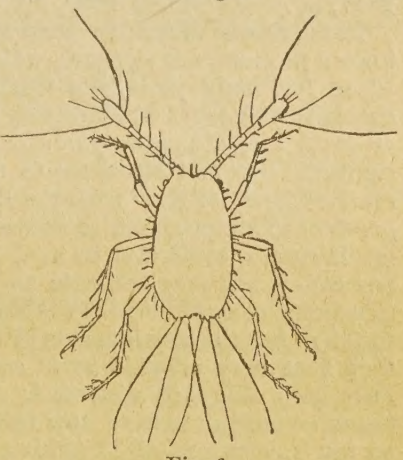


Fig. 6.

In the larva with its six caudal setæ, and in the adult ♀ with 11 joints in the antennæ, there are suggestions of the genus *Icerya*, but the form of the joints is different and most of the characters, notably the unique structure of the eyes, are divergent, as also they are, variously, from the other genera of *Monophlebidæ*, of which *Guerinia* alone has similar subpyriform joints in the antennæ. The long, circular, marginal processes are solid, and would be cylinders if they were of uniform size throughout; they are each moulded on and supported by a hair, and are quite analogous to the lamellæ of the genus *Orthezia*.

On November 2nd, 1889, I received several ♀ specimens of this remarkable Coccid from Mr. D. Morris, F.L.S., Assistant Director of the Royal Gardens, Kew, having been sent by Admiral Blomfield from Alexandria, Egypt, where "they were causing immense injury to fruit trees." They were for the most part alive, and moved slowly if disturbed. There was no trace of a male in any stage of development, which was unfortunate, for the imago would afford good generic characters.

I am indebted to Mr. G. S. Saunders for the illustrations.

CXLIV.—MAURITIUS HEMP MACHINES.

The subject of Mauritius hemp has been discussed already in the *Kew Bulletin* (March 1887, p. 8). Since that time considerable interest has been taken in India and the Colonies in the production of fibres suitable for rope and twine making, for which of late years there has been a considerable demand. In connexion with this interest numerous inquiries have been addressed to Kew respecting the best machines for cleaning the leaves and stems of plants yielding such fibres. The plants in most cases have been various species of *Agave*, *Furcræa*, *Sansevieria*, *Karatas*, *Bromelia*, and other monocotyledonous plants whose fibre bundles yield the particular kind of fibre in demand.

It is well known that certain fibre machines, more or less effective, are in use in Yucatan in the production of Sisal hemp, yielded by one or more varieties of *Agave rigida*. It is very probable that some of these machines could be successfully introduced into other countries where Agave plants are grown for fibre [*see* Kew Bulletin, March 1887, pp. 3–8; March 1889, pp. 57–61 ; and October 1889, p. 254].

In the case of Mauritius hemp we learn that the fibre machines, locally known as *grattes* or scrapers, which have been generally in use in that island for many years, are manufactured in the Colony. These are exclusively engaged in extracting fibre from the leaves by the *Aloes vërt* or fœtid Aloe (*Furcræa gigantea*). The leaves of this plant are very similar in size and character to those of *Agave rigida* var. *Sisalana* received lately at Kew from the Bahamas. There is little doubt that the *grattes* or fibre machines as now used in Mauritius, or with some slight modifications, could also be used in the treatment of Agave leaves. In any case it was very desirable to obtain exact particulars of the construction and capabilities of the Mauritius machines. They appear, so far, to fully meet the requirements of the Mauritius planters, and, moreover, they have been adopted after careful trial with other machines which have been ultimately discarded. The particulars desired in regard to the machines in use have now been furnished in an exhaustive manner by the Government of Mauritius, and they are published in the *Kew Bulletin* with the view of placing the information within reach of a large class of people interested in the subject.

ROYAL GARDENS, KEW, to COLONIAL OFFICE.

SIR, Royal Gardens, Kew, 6th November 1889.

I AM desired by Mr. Thiselton Dyer to inform you that the high prices now ruling for white rope fibres have stimulated inquiry in regard to their origin and production, and numerous applications have been made to Kew on the subject.

2. As you are aware a considerable industry has arisen in Mauritius during the last six or seven years in extracting fibre from the leaves of the Aloës vert (*Furcræa gigantea*). This fibre is known in commerce as Mauritius hemp, and it is regularly quoted in London prices current.

3. The success of the industry in Mauritius indicates that a tolerably successful machine has been found capable of preparing the fibre on a commercial scale. Information as regards the nature and working of such a machine is just now a matter of considerable interest.

4. Mr. Thiselton Dyer would be glad if the Secretary of State would approve of an application being made to the Government of Mauritius for such information; and it would be convenient if the information,

for a comparison of the results obtained in different countries, could be supplied in the form of replies to the questions given on the enclosed schedule.

I am, &c.
(Signed) D. Morris.

The Hon. R. H. Meade, C.B.

[Enclosure.]

Machines in Use at Mauritius for Extracting Fibres from leaves of *Furcræa gigantea*.

1. Name and description of machine (with address of maker)?
2. Weight and cost (not including power)?
3. How long in use?
4. Whether worked by hand, horse, or steam power?
5. If by steam, what is the registered horse-power necessary to drive one machine?
6. No. of men required to feed and remove fibre (not including carriers or other persons employed in bringing in leaves or in drying the fibre)?
7. Average out-turn of wet fibre for each machine per hour?
8. Average out-turn of dry fibre for each machine per day of — hours?
9. Average cost in labour, fuel, &c. in cleaning a ton of dry fibre?
10. Please add any other information respecting the character and working of the machine not included in the above inquiries.

Sir C. C. Lees to Lord Knutsford.

Government House, Mauritius,
My Lord, 20 February 1890.

I have the honour to transmit to your Lordship a copy of a report by the Acting Surveyor-General, Mr. Vandermeersch, forwarding replies to the questions annexed to Mr. Morris' letter of the 6th November 1889, which was enclosed in your Despatch, No. 369, of the 8th November, as well as four other documents regarding the extraction of fibre, and the machines now employed in Mauritius.

I am, &c.
(Signed) C. C. Lees,
Governor.

The Right Hon. Lord Knutsford, G.C.M.G.

[Enclosure.]

Report by Acting Surveyor-General, No. A/66, 17th February 1890.

I have delayed reporting upon this subject because I had to procure reliable information. I now forward formal replies to the queries of Mr. Thiselton Dyer. To these replies I have added the following documents, which, I hope, will make the information as complete as possible:—

1st. A very detailed and interesting memorandum on the subject kindly supplied at my request by Mr. Regis de Chazal, C.E. (Engineer to the *Forges et Fonderies de Maurice*) to which I have appended some supplemental notes by myself.

2nd. A plan of an installation for two "grattes" and a tracing (full size) of the "servante" to accompany Mr. de Chazal's memorandum.*

3rd. A pamphlet on Aloe fibre by Mr. Evenor de Chazal.*

4th. A statement of the actual results obtained at St. Antoine Hemp Factory during 60 days' work.

(Signed) A. VANDERMEERSCH,
Acting Surveyor-General.

17th February 1890.

[ENCLOSURE No. 2.]

Answers to queries respecting machines in use at Mauritius for extracting fibres from leaves of *Furcræa gigantea*.

1. The machine in general use in this Colony is a drum of 2 feet in diameter by 1 foot in width, upon which are bolted blades in 2-inch L steel, and which revolves at a great speed, the blades passing close to a guide in cast iron ("servante"). The machine is called a ("gratte") scraper. It is manufactured in the Colony by all engineers' shops, but chiefly by the "Forges and Fonderies de Maurice."
2. The weight of the drum is about 4 cwt., the cost, including the driving pulley and bolts (exclusive of framework, masonry, and setting), is about Rs. 250 per "gratte."
3. This gratte has been in general use in Mauritius for the last six years.
4. The machine is worked by steam or by water power.
5. The registered horse-power to drive one gratte is 3 h.p.
6. One gratte is served by two men who stand on each side of the gratte, and who work alternately. One of them must be left-handed. One carrier will bring in sufficient leaves from the yard to the gratte, and another man will suffice to remove the wet fibre produced by two grattes and to carry this fibre to the weighing machine and thence to the cleaning pits.
7. The out-turn of wet fibre for each machine per hour is, on an average, 42½ kilog., that is taking eight hours' work per day, which is as much as the men can do, the work being very fatiguing.
8. The out-turn per day of eight hours is per machine (gratte) 340 kil. wet supplying on an average 97 kil. of dry fibre (or 28½ °/₀ of the wet fibre).
9. The average cost in labour, fuel, &c. in cleaning a ton of dry fibre, packing, and transporting to the place of shipment is Rs. - - - - - - Rs. 150

   If to the above we add other charges, viz., collecting leaves, carting, mill management, interest on capital, &c., say about Rs. - - - - - 75

   The total average cost of one ton of fibre ready for shipment is - - - - - - Rs. 225

(Signed) A. VANDERMEERSCH,
17th February 1890. Acting Surveyor-General.

* Not reproduced.

Summary of a Note on the Fibre Machines generally in use at Mauritius for Cleaning Aloe Fibre, by M. Regis de Chazal.

1. *Description of Machine.*

The machine generally in use in Mauritius for extracting fibre from the leaves of the green Aloe (*Furcræa gigantea*) is known under the name of *gratte*. This gratte consists of a drum about 2 feet in diameter and 1 foot wide. On the circumference of this are bolted 2-inch L-shaped blades parallel to the axis. These blades are generally of iron, but steel is preferred. They are firmly fixed to the drum by means of bolts and nuts. The drum is mounted upon an axle and made to revolve with great rapidity close to and against the front or edge of a feed table (*servante*). The feed table is adjusted by means of screws so as to approach the revolving drum within a distance of quarter inch to an inch, as required. It is composed of a stout brass plate and lip fitted firmly to a piece of hard wood by means of a bolt. The plate and wood are themselves fixed to two wooden bars, 6 inches by 6 inches, which serves as guides in the movement of the feed table backwards and forwards.

The most difficult task in connexion with working the gratte is the exact adjustment of this feed table. It is most necessary that the blades on the drum and the edge of the feed table are so adjusted that they work freely and evenly and at the same time bring every fibre in the leaf in contact with the beaters. The proper adjustment of the feed table in regard to the beaters is stated to be the secret of the success of the *gratte* as a fibre machine. This adjustment should be performed with the utmost care before the machine is started. When once adjusted it is important to maintain the feed table in its proper position and prevent any displacement during the process of working.

The drum should be turned at an average rate of 700 revolutions per minute, while a higher rate of speed may be maintained without injury, it is found not desirable under any circumstances to fall below 620 revolutions per minute. The best and most economical work is that done at 700 revolutions per minute.

Method of Working.

The Aloe leaf is presented tip first along the feed table, and is drawn down between the latter and the drum. It is thoroughly beaten by the grattes to about three-fourths of its length. By these means the pulp is removed and the fibre is left. The leaf is then withdrawn and the other end presented to the beaters until the whole is cleaned.

Two men usually work at each machine. They stand one on each side of the feed table and work alternately. It is desirable for rapid work that one of the men should be left-handed. Each man in turn presents his leaf to the machine and withdraws it as soon as possible. In a regular and efficient working of the machine it is arranged that one man or the other should always have a leaf in the machine in course of being cleaned. To avoid accidents the feed table is now provided with a wooden guard. This guard prevents the hands of the work-people from being caught by the beaters.

Mounting the Machines.

The machines are generally mounted in pairs, both working on the same axle, and driven by steam or water power. The driving wheel

fixed midway on the axle between the two machines should have a minimum diameter of 18 inches, with a strap 6 inches wide. A single adjustment of the feed table should last from eight to 15 days. At the end of that time it is generally found necessary to readjust the parts to ensure good results.

The framework of the machine is securely attached to substantial masonary work by large bolts about 5 feet long. The machines must be thus firmly secured or the vibration during the process of working would soon cause them to become detached. The arrangement of the machines in pairs on the same axle could be extended in the same line indefinitely, provided the necessary distance is preserved between the centre of each machine. One of the largest fibre factories in Mauritius contains 12 machines, that is, six pairs arranged as already described.

Out-turn of Fibre.

As already stated each machine is served by two men standing on each side of the feed table. One carrier supplies them with fresh leaves while another is engaged in receiving and removing the wet fibre. The task of a man, which can be easily accomplished in six to eight hours, is 250 lbs. (or 125 kilos) of wet fibre. The wage paid for this is one rupee. Sometimes, however, by extra work (for which the workman is paid at the rate of 50 cents per 100 lbs.) as much as 800 to 900 lbs. of wet fibre have been produced in a single day. This amount, however, is quite exceptional.

The proportion of dry fibre to the wet fibre as it leaves the machine varies from 22 to 30 per cent.

The yield of dry fibre in relation to the weight of green leaves varies according to the age of leaves and the characteristics of the season. The riper the leaves the larger the yield of fibre ; a wet season producing leaves charged with moisture will also affect the result. To produce a ton of dry fibre ready for shipment requires from 80,000 to 150,000 leaves, varying according to the size and age of the leaves and character of the season. The cutting of the leaves costs from 50 cents to one rupee the 100 bundles of 25 leaves each. The higher price is paid when labour is scarce, or when the ground is rough and difficult to traverse. The cost of baling the dry fibre costs from 40 to 50 cents the bale of 150 kilos. It may be assumed that a set of 10 to 12 fibre machines properly installed and attended by men accustomed to the work will turn out on an average about 1,200 kilos (2,645 lbs. avoir.) of dry fibre per day.

Difficulty is sometimes experienced in obtaining pairs of right-handed and left-handed men for each machine. Right-handed men are, as may be expected, in excess. As already shown, it is necessary for economical working to have a right-handed and a left-handed man to attend to each machine.

Treatment of the Fibre.

When the fibre first leaves the scraping machine it is covered with mucilage possessing corrosive properties which dries on exposure to the air. The tendency of this mucilage, if left on the fibre, is to turn it of a yellow colour, and even sometimes of a reddish colour. To prepare

the fibre with a bright attractive appearance the best plan is to place it, as soon as it leaves the machine (or as soon as it has been weighed, to check the amount produced by each man), in warm water of a temperature of 60° to 80° Cent. (140° to 176° Fah.), and leave it there for about two hours. It should then be washed in two waters, and finally exposed to the sun to be dried.

A treatment recently employed consists in washing the fibre in cold water only. In the first washing soap is used at the rate of 2 to 3 per cent. of the wet fibre. After being thoroughly washed with soap the fibre is passed through pure water until all the soap has disappeared, then exposed to the sun and dried. By these means a beautifully white fibre is obtained. When thoroughly dried the fibre is afterwards scutched, to get rid of pith and dust. This process is usually performed by a machine constructed on the plan of an ordinary *gratte*, but fitted with four blades instead of 12. These also turn away from the feed table instead of towards it. The fibre is inserted at an opening about 6 inches higher than the centre of the axle. It is carried away by the movement of the beaters, and remains on the top of the drum, where, exposed to the repeated blows of the beaters, it is cleaned of all dust and impurities.

It may be mentioned that, owing to the corrosive nature of the juice of the Aloe leaves, the workpeople are compelled to wear strong leather gloves. The gloves are fastened to the wrist by leather bands. As the gloves are provided by the proprietor, and they wear out very quickly, they constitute quite an appreciable item in the cost of working a fibre factory.

Addenda.

The upper half of the gratte is covered with a semicircular wooden cover, to prevent the "pulpe" from being splashed about the place; this "pulpe," which is semi-liquid, falls on an inclined plane standing about 1 foot below the gratte, and upon which it slides into troughs, wherefrom it is gradually removed and spread to dry.

There is a considerable quantity of this "pulpe" produced for one ton of dry fibre (about 20 tons), and large areas are required to stack it. The smell from the decomposing "pulpe" is anything but agreeable.

During the first years of Aloe fibre manufacture in Mauritius no use was made of the residue ("pulpe"), as it was found to burn the plantations when used as manure. Of late, however, it has been extensively employed by mixing it with other manure, and it has given good results in the cane fields.

(Signed) A. Vandermeersch,
17 February 1890. Acting Surveyor-General.

Statement of Work executed at St. Antoine Hemp Factory, in District of River du Rempart, Mauritius.

Year 1889.

February	15 days' work	with 9	grattes.
March	18	„ 11	„
May	20	„ 11	„
June	7	„ 11	„
	60 days.		

Equivalent to 630 days' work of one gratte.

The produce has been 213,371 kilos. of wet fibre, which have given—

401 bales of dry fibre, 1st quality.
6 „ coarse fibre, inferior quality.

407 bales, weighing 61,050 kilos.

Mean day's work = 10,175 kilos.
Proportion of dry fibre to wet fibre = 28·61 %.

A true copy of note supplied by Manager.
(Signed) A. Vandermeersch,
17 February 1890. Acting Surveyor-General.

CXLV.—SIBERIAN PERENNIAL FLAX.

(*Linum perenne*, L.)

The common flax (*Linum usitatissimum*) indigenous in the South of Europe and in the East, has been in cultivation from the earliest times. It is now largely grown throughout the northern hemisphere, and extends to 54° N. lat. It is one of the most useful members of the vegetable kingdom, and the tenacity and lustre of its cortical fibres places it at the head of textile plants. The testa of the seed (Linseed) contains an abundant mucilage, and the embryo a fixed emollient oil which is very drying, and hence largely used by painters. What may possibly be regarded as a drawback of the ordinary flax is the fact that it is an annual and requires to be raised from seed year by year. The discovery of a perennial flax possessing the properties of the ordinary flax would naturally excite keen interest amongst flax growers. The subject appears to have cropped up from time to time during the last 50 years, but the results so far attained do not hold out the hope of a perennial flax taking the place of the present annual species. There is, it is true, a *Linum perenne*, L., which is a native of the British Islands. It is also found in Middle and Southern Europe, in Western Asia, and in India. This plant has numerous wiry, slender stems about 1 to 2 feet high. The flowers are about 1 inch broad, bright blue. Many attempts have been made to utilize this plant for yielding fibre or oil, and attention has been drawn to the fact that in some parts of the world such as Siberia, flax has at one time been prepared from it. At the present time it is doubtful whether flax on a commercial scale is obtained from any other than the common flax, *Linum usitatissimum*.

The following correspondence will serve to show what is at present known respecting perennial flax, and it may lead to a further elucidation of the subject.

Royal Gardens, Kew, to Foreign Office.

Sir, Royal Gardens, Kew, 16 November 1889.

I have the honour to inform you that Mr. Thiselton Dyer has received an inquiry in regard to Siberian flax, described as a perennial, much taller than the ordinary flax (which is an annual) and capable of yielding a succession of stalks from the same root for many years.

2. The only information on the subject so far attainable is given in the enclosed extract taken from Dr. Carpenter's "Vegetable Physiology" (London 1850) paragraph 517. It appears that the subject is more

fully dealt with in a much older publication, but no copy of this exists at Kew. "Vom perennirenden sibirischen Leine und dessen auch bey "uns mit Nutzen einzufuehrenden Baue handelt vorgaenzig, etc." D. Gottlieb Schrader, Halle, 1754.

3. If this perennial flax is still cultivated in Siberia and yields some of the flax exported from the Russian Empire, the fact would possess considerable interest to flax growers in the North of Ireland. At present the museums of the Royal Gardens possess no specimens of perennial Siberian flax, and beyond the meagre and somewhat obsolete information already cited, nothing is known of it in this country.

4. Mr. Thiselton Dyer would therefore express the hope that the Secretary of State will approve of the kind offices of Her Majesty's Ambassador at St. Petersburg being invited to obtain particulars of the different kinds of flax cultivated in Siberia. If a perennial flax is known there answering to the description given by Dr. Carpenter, it would be desirable to obtain for the Kew Museums specimens of the stems in various stages of preparation, and of the flax yarn as usually exported. It would also be desirable to obtain two or three pounds of seed of this perennial flax, in order that it may be experimentally cultivated in this country; in this connexion any information as to its cultural treatment would be serviceable.

5. I am to add that any moderate expenses incurred in this service will be defrayed by this establishment in usual course.

I am, &c.
(Signed) D. Morris.

Sir Villiers Lister, K.C.M.G.

[Enclosure.]

Extract from "Vegetable Physiology," by Dr. Carpenter (para. 517), London, 1850.

The only other species of this order, which is cultivated for the same purpose, is the Siberian perennial flax. This is a much taller plant, having coarser fibres; these are found to be very strong, but not so white or fine as those obtained from common flax. They serve very well, however, for the manufacture of coarse fabrics; and there is this advantage attending the cultivation of them,—that from the same root, a succession of stalks will be developed for many years; so that they require no further attention, than to be kept free from weeds.

Sir Robert B. D. Morier, G.C.B., G.C.M.G., &c., to the Marquis of Salisbury, K.G., &c.

My Lord, St. Petersburg, 20 March 1890.

In reply to your Lordship's Despatch, No. 83 of this series, and of the 21st November last, I have the honour to transmit to your Lordship herewith a copy of a letter, together with its enclosure, which I have received from Mr. E. F. G. Law, giving the result of his inquiries respecting Siberian flax.

I have, &c.
(Signed) R. B. D. Morier.

The Marquis of Salisbury, K.G.,
&c. &c. &c.

[Enclosure No. 1.]

Mr. E. F. G. Law to Sir Robert B. D. Morier, G.C.B., G.C.M.G., &c.

Sir, Constantinople, 1 March 1890.

In accordance with your instructions I have made inquiries respecting the Siberian flax referred to in the Marquis of Salisbury's Despatch, No. 83, Commercial, of November 21, 1889.

This flax is at present quite unknown in the St. Petersburg market, in which it would be most likely to be found. A local English merchant has kindly undertaken to endeavour to procure samples for me, but these had not been received when I left St. Petersburg.

Meanwhile, through the kindness of the Vice-Director of the Department of Trade and Manufactures, I have received some information on the subject, emanating from the Director of the Technological Institute, and from Professor Batalin of the St. Petersburg University.

I append translations of the communications of these gentlemen.

I have, &c.

(Signed) E. F. G. Law,

Commercial Attaché.

His Excellency
Sir Robert B. D. Morier, G.C.B., G.C.M.G,
&c. &c. &c.

[Enclosure No. 2.]

The Director of the Technological Institute writes:—

"Siberian flax (*Linum perenne*) is certainly different from the flax which is generally used in Europe. The difference is, that like perennial plants, it is cut and not pulled up by the roots, and therefore it is not annually sown like the ordinary blue-flowered flax (*Linum vulgare*) or the American flax with white flowers. The Siberian flax gives a short tow as the stems are short. The stems do not grow erect, but are bent, and even lie on the ground. The industrial use of this flax is unknown in Europe, where it has never been grown with the intention of using it. Whether it is used in Siberia or not I cannot say, but at a time when I interested myself in this subject I learnt that the Siberian flax was sold in St. Petersburg warehouses, and was distinguished by its proper name, and by its whiteness and softness, and by its freedom from 'Kostra' (Scutch?), and it is more expensive. The traders collect it in the Governments of Viatka and Vologda, on the banks of the Kama."

Professor Batalin writes:—

Perennial flax (*Linum perenne*) is a quite distinct plant, distinguishable from ordinary flax by many peculiarities. One of the chief distinctions is the colour, and also the thickness of the stem. The seed is dark brown, almost black, and quite flat, so that it is quite useless for the extraction of oil. The pod has little of the soft part which is found in ordinary flax. Thirty or 40 years ago experiments were made in Germany to grow perennial flax for the tow. In the works of Langethal and Metzger, the results of these experiments are thus spoken of:—"The plant grows more evenly and longer than ordinary flax; "foul grasses easily overrun and even choke it, for which reason it is "necessary to cover the plants with manure in autumn. It does not, "under any circumstances, grow more than two years in the same "place, as in any case it gets overgrown by foul grasses. It is par- "ticularly sensitive to frost (*i.e.*, probably in winters without snow?). "The tow was found to be coarser than that of ordinary flax, and

" consequently it is very improbable that its cultivation will be " extended." In South Russia, if I am not mistaken, in the Government of Kieff, someone made the experiment of sowing Austrian perennial flax (*Linum austriacum*), which is very similar to the *Linum perenne*, but from this such coarse tow was obtained that its further cultivation was abandoned. Of this latter experiment an account was given in the " Zemledelcheskoy Gazette " (Agricultural Gazette) in " the year 1870."

A little further information has been obtained respecting perennial flax in this country. In " Our Farm Crops " (Edinburgh, 1859), Professor Wilson states " Some experiments recently made with *Linum perenne* " tend to show that its perennial nature and its capability of sustaining " itself on soils of the poorest description entitle it to more consideration " than it has hitherto received at our hands. Its hardy nature and " its branching and vigorous habit of growth when a little care and " attention is bestowed upon it, would lead us to believe that on the poor " thin soil of chalk formations for instance it might be cultivated with " advantage, and would, probably, on such soils give a far larger return " than could be obtained from any of the plants we at present cultivate. " The branching habit of the plant would be favourable to the production of seed but unfavourable, it is true, to the production of fibre."

The experiments mentioned by Professor Wilson in the above extracts were undertaken by Professor Buckman and described by him in the *Agricultural Gazette*, 1860, p. 270. Professor Buckman called particular attention to the probability of *Linum perenne* yielding fibre which might be used for paper making. The results of his botanical experiments and conclusions were first communicated to the British Association for the Advancement of Science in 1857. In 1860 he states, " I have made a new plot of this plant from seed collected from the old " one, and the whole plant maintains its character, if anything in an " improved condition, so that we may at present be said to possess in it " a form of linseed which grows to as much as 30 inches in height, and " I should say capable of producing a far greater quantity from the " readiness in which its stems branch and this on very poor soil, not for " a single year but for years, as my plot sown in 1854 is still in good " growth, and yielded a good crop in 1859 (its fifth year), although " annually seeded for that time. However, as regards the fibre, I must " confess that I am still in want of conclusive evidence with respect to " its value and fitness for linen and paper making, but of this I can have " little doubt, as its family is a deservedly reputed one for these " purposes."

CXLVI.—LIBERIAN COFFEE.

(*Coffea liberica*, Bull.)

The cultivation of Liberian coffee in the Straits Settlement was the subject of a note in the *Kew Bulletin*, November 1888, p. 261.

This large-beaned coffee has apparently found a congenial home in the Malay Peninsula, more especially at Malacca and in the native States of Sungei Ujong, Perak, and Selangor.

In 1888 Liberian coffee shipped to this country, described as " very good, bold, clean," was valued at 75*s.* per cwt. An experiment was tried to ship Liberian coffee in parchment and have it cleaned in this

country. This was not wholly successful, owing partly to the fact that the coffee was not thoroughly dried before shipment, and arrived in a mouldy condition, and also owing to the peculiar character of the "parchment" skin, which, in this species, becomes very hard and difficult to remove if left long before cleaning.

It will probably be found more advantageous for planters to both pulp and "mill" or clean Liberian coffee on the spot. In Java we learn that several Liberian coffee estates there continue to yield satisfactory results. The cherries, in some cases, are fermented before pulping, to soften the fibrous character of the outer integument. This is also said to improve the market value of the produce.

In regard to the yield of Liberian coffee estates in the Malay Peninsula, we are indebted to Messrs. Hill and Rathborne, of Singapore, for the following memorandum:—

PLANTERS will be interested in the following Statement of the produce of Liberian Coffee Estates in the Native States, which shows an average for young Coffee Estates of $8\frac{3}{4}$ to $9\frac{3}{4}$ cwts. per acre, while 45 acres in full bearing in S'lian yielded 495 cwts., or just 11 cwts. per acre:—

LIBERIAN COFFEE CROPS FROM ESTATES IN THE PROTECTED NATIVE STATES OF THE MALAY PENINSULA.

	Produced.	
	Pikuls.	Cwts.
LINSUM ESTATE, IN SUNGEI UJONG—		
In 1884, 28 acres under 4 years old - - -	84	or 99
„ 12 „ „ 3 „ - - -		
In 1885, 28 „ over 4 „ - - -	312	„ 370½
„ 12 „ under 4 „ - - -		
„ 25 „ „ 3 „ - - -		
In 1886, 40 „ over 4 „ - - -	311	„ 369
„ 25 „ under 4 „ - - -		
In 1887, 65 acres of coffee in full bearing - -	345	„ 409½
„ 1888, 65 „ „ „ - -	542	„ 643½
„ 1889, 65 acres in full bearing for 7 months ending July 31 - - - -	518	„ 615
S'LIAN ESTATE, IN SUNGEI UJONG—		
In 1885, 8 acres under 4 years old - -	78	„ 92
„ 28 „ „ 3 „ - - -		
In 1886, 8 „ „ 5 „ - - -	284	„ 336
„ 28 „ „ 4 „ - - -		
„ 9 „ „ 3 „ - - -		
In 1887, 36 „ „ 5 „ - - -	208	„ 238
„ 9 „ „ 4 „ - - -		
In 1888, 45 acres in full bearing - - -	417	„ 495
„ 1889, 45 „ „ „ up to July 31 -	300	„ 356
WELD'S HILL ESTATE, IN SELANGOR—		
In 1886, 19 acres under 4 years old - - -	274	„ 325
„ 36 „ over 4 „ - - -		
In 1887, 55 acres of coffee in full bearing -	339	„ 402
„ 1888, 55 „ „ „ - -	422	„ 501
„ 1889, 55 „ „ „ up to July 31	406	„ 482
BATU CAVES ESTATE, IN SELANGOR—		
In 1888, 12 acres under 4 years old - - -	66	„ 69½
„ 1889, 12 „ 5 „ up to July 31 -	46	„ 54½